

CHAPTER 1

DOT-BOMB POST-MORTEM

Web-Based Metrics and Internet Stock Prices

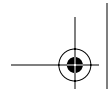
Nick Bontis and Jason Mill

ABSTRACT

A few of years have passed since the so-called dot-com crash and researchers are now conducting post-mortem reviews of the valuation debacle. At the time, there was widespread agreement within the analyst community that the value of a Website was inherently related to the number of potential customers who came to the site for information and eventually purchased a product or executed a service. As a follow-up to this mode of thinking, we consider the relationship between stock prices and Web metrics in addition to traditional accounting information for a sample of 15 top Internet companies. Specifically, we develop various regression models with the following four variables: unique visitors, revenues, gross margin, and sales and marketing expenses. Our results support the hypothesis that Web metrics did as equally good a job at explaining Internet stock prices as traditional accounting measures did. It seems that as stock price valuations for these companies increased, analysts required new metrics to justify their astronomical valuations and veered away from generally accepted accounting principles.

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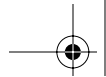
*If I were a Business School Professor in Finance, I would assign the following exam:
“How do you value Internet companies?” and I would fail any student that
did not leave the answer sheet blank.*

—Warren Buffet, Chairman and CEO of Berkshire Hathaway

INTRODUCTION

The knowledge era is upon us and the Internet is the catalyst that is accelerating the growing importance of information. In the new economy, knowledge management discriminates between the sustainable and unsustainable advantage of firms (Bontis, 1999, 2001). The efficient use of acquired knowledge is the ultimate core competency required for competitiveness and prosperity. The ever-increasing popularity of fields such as organizational learning (Crossan, Lane, & White, 1999; Bontis, Crossan, & Hulland, 2002), knowledge management (Nonaka & Takeuchi, 1995; Bontis, Dragonetti, Jacobsen, & Roos, 1999; Stovel & Bontis, 2002) and intellectual capital (Bontis, 1996, 1998, 2002; Stewart, 1997; Sveiby, 1997) clearly supports this trend and demonstrates the belief that the dissemination and use of information is of critical importance. The advent of the Internet has brought people together to share ideas, knowledge, products, and services. However, the driving business force behind the Internet will ultimately be profit as companies take advantage of the Web as an advertising medium and as a unique business channel. No longer will the creation of a simple Web presence be sufficient cause for heavy investment in an Internet strategy. The development of entirely new Web-based businesses spawned the phenomenon of the “net stock” also referred to as the “dot-com.” Leading up to the crash of 2000, these companies struggled in search of profitability. Analysts struggled to justify the enormous market capitalizations that accompanied them.

For the purposes of this paper, Internet stocks will be narrowly defined as those Web-based companies or dot-com organizations that typically interfaced directly with consumers. In general, prior to the technology crash of 2000, Internet stocks were not subject to the requirement of current profitability. Investors were content to wait for the future on the chance they would own a piece of the new economy. In the short term, however, we were left with the challenge of putting a price on that chance. Davis, Halper, Grebb, and Schibsted (1999) identifies 20 traditional industries that would become dinosaurs in the Internet revolution unless they changed the fundamental premise of their businesses. They cited such industries as insurance, newspapers, travel agents and car dealers. They argued that these industries would embrace new e-commerce ideals and displace traditional business models in order to survive the Web revolution.



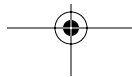
Since the new model would likely be realized by only a few companies, investors staked their claims early because the market was moving too quickly to wait for a clearer direction to unfold. Wooley (1999) highlights how valuations were very difficult:

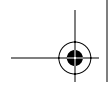
To get a chuckle (or a groan) out of an analyst, ask for the best way to value Internet stocks. Because so few of these companies make money, the traditional method of weighing the stock's share price against the company's earnings—the good old price to earnings ratio—doesn't work.

Internet stocks were different from their traditional counterparts. The untapped potential of the Web made them different. Fox and Hodges (1999) warn that Web-based companies were not following the traditional rules of the game. The market winners ignored financial performance and focused on moving quickly, spending any amount of money necessary to build a vision and claiming as much Internet market share as possible. That market share was not measured in revenue; in many cases there was no revenue. Internet market share was measured by people. The more people that visited a site and the longer they stayed made a site more attractive to advertisers and investors and created greater untapped potential as those people were slowly converted to customers.

Although the remarkable growth of e-commerce had been embraced by many businesses, analysts were still skeptical at our ability in measuring the success of such Web-based ventures. As a measure of performance the use of Website metrics such as "number of page hits" became very popular. Website counters were widely used but offered little insight into the value created by investing in a Web presence. The search for better Web metrics was most important to companies that were betting their entire business on Internet advertising and sales.

E-businesses such as Yahoo, Amazon.com, eBay, and E*trade depended solely on business conducted over the Web and/or advertising revenue. The ability to report meaningful Web metrics to customers, advertisers, Web users, and investors was crucial. The value of a Website was inherently related to the number of potential customers who visited the site for information and eventually purchased a product or executed a service. However, financial analysts were having difficulty in valuing e-businesses and justifying observed stock prices. Nocera (1999) reports that Lise Buyer, a leading Internet analyst at Credit Suisse First Boston, had simply abandoned traditional valuation models for Internet stocks altogether. The purpose of this paper is to conduct a post-mortem review of the valuation techniques used by analysts for Internet stocks prior to the technology crash of 2000.





TRADITIONAL METHOD OF STOCK EVALUATION

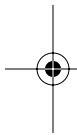
Fundamental analysis failed in the case of Internet stocks. This comes as no surprise since the determination of stock value is generally based on discounted future cash flows and virtually all Internet stocks were operating at a perpetual loss prior to 2000. Fox and Hodges (1999) emphasize how customary financial measures were difficult to interpret for Internet stocks:

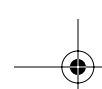
Internet stocks aren't like other stocks. Figuring out whether any stock is reasonably priced is something of a crapshoot, but for most companies there are at least some widely agreed upon yardsticks: book value, current earnings, projected earnings growth. Internet companies have no tangible assets, they boast little or nothing in the way of earnings, and their future growth is impossible to predict reliably. So investors can't use their customary yardsticks.

Furthermore, it was not clear when positive cash flows could be expected given that spending on development, growth, and acquisitions continued to outpace revenue growth. Short-term survival was funded by large cash reserves raised from lucrative IPOs (initial public offerings) and additional stock offerings made after the share price had been driven up by the market. Lashinsky (1999) concludes that Internet companies typically had six quarters of cash reserves at their current expense rates and those that had carved out a niche could often raise much more. By early 2000, Amazon.com had nearly 16 quarters of cash, allowing them plenty of time to hold on.

Valuation models based on discounted cash flows (DCF) or dividend discount models (DDMs) had been used successfully to value securities but were not useful for companies that were unlikely to show a profit in the foreseeable future. This certainly does not mean that Internet companies had no economic value but rather, they had no intrinsic value as determined by traditional financial measures. In fact, these dependable metrics were soon deemed antiquated, as stocks severed their ties to gravity (Briody, McDonald, & Moskowitz, 2002).

Alternative pricing models included the Capital Asset Pricing Model (CAPM) and other common yardsticks including Price/Earnings (P/E) and PE/G (Price/Earnings/Growth) ratios (Briody et al., 2002). Internet stocks were considered very risky ventures and often came with high expected returns. CAPM predicted high returns for risky Internet stocks as expected; however, this theoretical formula was not suitable for valuation purposes. Traditional financial measures such as earnings and dividends were not useful for Internet stocks since they generally had neither. Given that Internet stocks could not be compared using traditional accounting





metrics, a new basis of benchmarking was required. The analyst community quickly gravitated toward Web-based metrics.

WEB METRICS

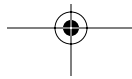
Measurement of Web activity is no different than television's use of Nielsen ratings or radio's use of Arbitron (Vonder Haar, 1999). Many measurements have been used to demonstrate the popularity of Websites, the earliest of which was the hit. Web sites boasted "millions served" but it was immediately obvious that the number of hits was a poor, and highly subjective, measure of Website value. The number of hits depended heavily on Website design, a single page could have several hits, and the number of hits did not discount page refreshes or a user backing up and reloading pages that had previously been viewed. There is more than a little room for manipulating the number of hits a single user will generate in a session.

The sophistication of Web metrics has improved significantly since the early days of the simplistic counting of hits. Various Web metrics have been developed that attempt to provide more meaningful measures of Web performance. These second-generation Web metrics include click-throughs, unique visitors, reach, length of stay, registered users, and repeat visits.

The various Web metrics that have been used along with the pros and cons of each are summarized in Table 1.1 (Vonder Haar, 1999). Currently,

Table 1.1. Summary of Web Metrics

<i>Web Metric</i>	<i>Description</i>
Hit	One count per request for data. Highly subjective and easily manipulated.
Page View	One count per HTML page. A better measure of an advertising opportunity given that advertising banners are changed with each new page served.
Click-Through	Tracks the number and percentage of customers that follow an advertising link. Sites with higher click through numbers/percentages can drive higher advertising revenue. Specific to advertising potential.
Unique Visitors	Counts unique IP addresses to determine the number of individuals viewing a site. A useful metric to an advertiser that wants to expose as many people as possible to their product.
Reach	The percentage of the Internet population visiting a particular site per month. Based on sample user-groups. Internet population is not well defined or accurately known.



**Table 1.1. Summary of Web Metrics (Cont.)**

<i>Web Metric</i>	<i>Description</i>
Length of Stay	The average length of stay can identify sites whose users spend little time per page and are not likely to read ads versus those sites that attract users that absorb the information presented. Could be affected by transfer rates and overall Internet performance; slow transfer rates would artificially improve this metric.
Registered Users	Number of users who have registered by providing name, age, and/or other demographic data. The use of cookies and other tools can accurately identify the users who are visiting a site or viewing an ad. User-specific ads can be viewed. Provides greater user information; however, many users will not register.
Repeat Visits	A measure of the number of times a user may view a specific advertising banner.

Vonder Haar (1999)

companies such as MediaMetrix, Service Metrics, netScore, and Nielsen's NetRatings offer services to track and report Website performance statistics that Web businesses can use to demonstrate their popularity, Internet market share, or advertising potential to investors and advertisers.

Combinations of the above and additional metrics are currently offered by MediaMetrix in their measurement reports (see www.comscore.com). These reports are most valuable to companies that are not able to track, report, or benchmark the metrics themselves, or for those companies looking for an impartial third-party assessment. The MediaMetrix measures include: (1) unique visitors; (2) reach; (3) average usage days per user; (4) average unique pages per user per day and month; (5) average minutes spent per person per page, per day and per month; (6) age and gender composition; and (7) demographic composition among others.

The Web metrics most relevant to a particular Website or advertiser looking for prime Web space are those that accurately reflect the type of business or message to be presented. Clearly, not all Web metrics are created equal and many do not find common relevance across the diverse range of Websites analysts and investors wish to compare. Of the Web metrics discussed above, the number of unique visitors provides the most generally applicable and unbiased measure of Website value. It is a specific and well-defined measure, is not subject to server or Internet performance levels, and is generally applicable across most Websites. Thus, unique visitors may provide a relevant and highly valuable measurement for comparing and valuing Internet stocks that do not lend themselves to traditional metrics and valuation methods.



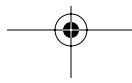
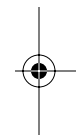
LITERATURE REVIEW

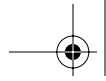
The academic literature in the Web metric field is sparse. This is attributable to the novelty of the measurement techniques that have only recently gained widespread use and to the limited number of firms available for study. We believe that this field is at the embryonic stage of an exciting research trajectory. As reported by Hand (1999), very few studies in Internet stock valuation have been published in academic literature. Hand examined the claim that larger losses in Internet stocks translated to higher stock prices (Hand, 1999). Wysocki (1998) examined the cross-sectional and time-series determinants of message-posting volume on stock message boards on the Web. In 1999 Wysocki used pre-announcement and announcement period message-posting activity on *The Motley Fool* stock chat boards to test Kim and Verrecchia's (1997) predictions on the relation between trading volume during an earnings announcement and the amount of private investor information prior to and during the earnings announcement.

In another study, Cooper, Dimitrov, and Rau (1999) document a striking abnormal return of 125% for the 10 days surrounding the announcement by a firm that was changing its name to an Internet-related ".com" one. Schill and Zhou (1999) compare investors' valuations of Internet carve-outs with those of the parent. They find several examples of parents whose value in holdings of carved-out Internet subsidiaries violate the law-of-one-price by exceeding the market value of the entire parent. Such violations are large and remain over an extended period of time. Related to the Internet subsidiary is the emergence of the "tracking stock." Several companies, Donaldson Lufkin & Jenrette (DLJ Direct) and Disney (Go Network) for example, have sold the "net" part of their businesses to the public by spinning them off into separate companies. Doing so allows these companies to unlock the value of the underlying business and capture the price-to-hype ratios of an Internet company without giving up control or profits (Adamson, 2000).

HYPOTHESIS DEVELOPMENT

Our research objective is to assess the importance of Web metrics in predicting Internet stock prices at a time when traditional accounting measures did not make sense. Pundits alleged that conventional accounting data, such as earnings and book values, had little or no relevance to Internet firms' stock prices because the vast majority of Internet firms had never reported a profit prior to the technology crash of 2000. Traditional pricing models based on accounting information, such as Ohlson's equity valua-





tion model, posit that a firm's stock price is a linear function of book equity, net income, net dividends, and other information that helps predict future abnormal earnings but is not yet incorporated in current financial statements (Ohlson, 1995). As a response to the insufficient explanatory power of traditional accounting measures, several Internet analysts resorted to Web-based metrics to help validate their predicted valuations. To test this hypothesis, we propose that Web-based metrics did as equally good a job in predicting Internet stock prices as compared to traditional valuation models based on accounting information. In this context, consider the following regression model:

$$P_{it} = \beta_0 + \beta_1 \text{REV}_{it} + \beta_2 \text{MAR}_{it} + \beta_3 \text{SLM}_{it} + \beta_4 \text{UNQ}_{it}$$

where P_{it} is the stock price P of firm i at time t , β represents the standardized coefficient of each variable, REV is the firm's revenues, MAR is the firm's gross margin, SLM is the firm's selling and marketing expenses, and UNQ is the reported number of unique visitors to the firm's Website.

The equation above contains both traditional accounting variables (i.e., REV , MAR , and SLM) as well as the Web-based metric that describes the number of unique visitors (i.e., UNQ). Given that Internet market share is linked directly to the number of distinct users that visit a Website, economic value is thought to be created by the number of "unique users" that a Website can attract. Based on our previous discussion, we hypothesize the following:

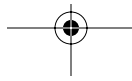
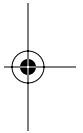
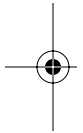
Hypothesis 1: *Website metrics do as good a job at explaining Internet stock prices as traditional accounting measures do.*

In other words, we expect the following three conditions to hold true:

- I: $\beta_1, \beta_2, \beta_3$, and $\beta_4 > 0$
- II: the final specified model should be robust
- III: β_4 should be substantive and significant

where:

- β_1 = variable coefficient for REV (revenues)
- β_2 = variable coefficient for MAR (gross margin)
- β_3 = variable coefficient for SLM (sales and marketing expenses)
- β_4 = variable coefficient for UNQ (unique visitors)





DATA COLLECTION

To test the aforementioned hypothesis, we collected data for 15 of the top Internet firms that were publicly trading by the last quarter in 1999 prior to the technology crash in early 2000. We coded monthly stock price, financial statement, and unique visitor data. Although there were over 250 net stocks listed by September 1999, a significant proportion of these had gone public within the last couple of quarters, leaving only a handful that were publicly trading at the beginning of calendar 1999. This issue limited the size of our sample significantly.

Two separate sources of data were combined in order to complete the overall sample of 10 periods of data for each of 15 firms. The financial statement data was collected by Credit Suisse First Boston and this was combined with the Web-based unique visitor data that was collected by MediaMetrix. Both of these sources followed the ISDEX Internet Stock Index (see www.InternetNews.com), which represented the most comprehensive listing of Internet companies at the time. Hand (1999) reports that ISDEX is one of the most widely recognized Internet indices reported by such media centers as *The Wall Street Journal*, *Reuters*, *Dow Jones Newswire*, and *CNBC*. ISDEX represents over 90% of the capitalization of the Internet stock universe on an ongoing basis. Companies in the e-commerce sector must attract at least 51% of their revenues from the Internet to qualify for listing.

DESCRIPTIVE STATISTICS

Table 1.2 provides selected information for the sample of 15 companies on a firm-by-firm basis. The 15 companies are sorted based on the number of unique users reported on September 17, 1999 for the end of the previous month. For example, Yahoo (YHOO) had the largest user base in our sample with over 40 million unique users as compared to Cyberian Outpost (COOL) with approximately 331,000 unique customers. The greatest change in user base from our earliest report date of October, 29 1998, was Beyond.com (BYND), which increased the number of its unique customers by a remarkable 387%.

Table 1.2 also shows the closing stock price and market capitalization for each stock. The accompanying change values measure the difference as reported from October 29, 1988, to September 17, 1999. The largest gain in stock price was by eBay (EBAY) with an astounding 430%. Financial accounting data is represented by revenue, gross margin, and sales and marketing expenses. These figures are annualized based on the previous quarter in millions of dollars. The most significant growth for each of these values was by At Home (ATHM) with a spectacular 3,940% increase in

Table 1.2. Sample Highlights

Stock Symbol	Unique Users		Stock Price		Market Capitalization		Revenues		Gross Margins		Sales & Marketing	
	17-Sep-99	Change	17-Sep-99	Change	17-Sep-99	Change	17-Sep-99	Change	17-Sep-99	Change	17-Sep-99	Change
<i>Internet Companies with Unique Users</i>												
YHOO	40,237	49%	\$163.13	149%	42,251	244%	461	115%	398	107%	171	86%
LCOS	29,379	57%	\$44.44	107%	3,880	144%	180	137%	143	197%	96	99%
SEEK	20,262	83%	\$28.75	-13%	1,800	73%	145	88%	76	20%	112	121%
CNET	8,514	36%	\$38.31	283%	2,793	313%	102	77%	65	122%	28	76%
SPLN	4,050	54%	\$26.06	86%	584	120%	52	75%	25	87%	33	73%
<i>Internet Companies with Unique Customers</i>												
AMZN	10,700	139%	\$63.81	203%	21,517	241%	1,258	105%	270	94%	344	129%
EBAY	5,600	367%	\$141.00	430%	18,133	472%	198	283%	154	256%	92	319%
ONSL	1,382	68%	\$15.19	-15%	298	-12%	326	41%	10	-61%	39	51%
BYND	1,300	387%	\$14.81	85%	533	144%	105	170%	16	174%	83	156%
EGGS	1,100	355%	\$7.56	5%	233	33%	162	16%	12	-23%	38	37%
COOL	331	106%	\$8.25	-33%	190	-30%	131	92%	14	104%	38	78%
<i>Online Internet Service Providers</i>												
AOL	19,600	45%	\$43.00	168%	95,460	230%	5,508	60%	2,544	103%	856	104%
ELNK	1,335	64%	\$40.13	2%	1,288	16%	312	57%	178	57%	90	127%
MSPG	1,228	170%	\$27.13	36%	1,720	67%	343	199%	226	173%	58	199%
ATHM	620	195%	\$38.44	71%	14,142	160%	402	626%	252	3,940%	172	766%
Average		145%		104%		148%		143%		357%		161%

Note: Change values represent percentage difference from starting date of study: October 29, 1998. Unique Users (number of unique visitors in previous month in thousands), Stock Price (the monthly stock price adjusted for splits and dividends as reported on the day of CSFB's Internet Valuation Update), Market Capitalization (the monthly market capitalization reported on the day of CSFB's Internet Valuation Update), Revenues (annualized revenues of previous quarter in millions of dollars), Gross Margin (annualized gross margin of previous quarter in millions of dollars), Sales & Marketing (annualized sales and marketing expenses of previous quarter in millions of dollars).



gross margin. (Please refer to the Appendix for a more detailed description of each company in this study.)

Table 1.3. Descriptive Statistics

	<i>Descriptive Statistics</i>			<i>Pearson Correlation Matrix</i>			
	<i>Mean</i>	<i>Std. Deviation</i>	<i>Price</i>	<i>REV</i>	<i>Mar</i>	<i>SLM</i>	<i>UNQ</i>
PRICE	48.4	38.6	1.000				
REV	479.8	1,068.8	0.016	1.000			
MAR	198.6	452.7	0.097	0.980	1.000		
SLM	102.3	160.8	0.102	0.969	0.966	1.000	
UNQ	7735.2	10,111.0	0.469	0.259	0.337	0.370	1.000

Note: PRICE (the monthly stock price adjusted for splits and dividends as reported on the day of CSFB's Internet Valuation Update), REV (annualized revenues of previous quarter in millions of dollars), MAR (annualized gross margin of previous quarter in millions of dollars), SLM (annualized sales and marketing expenses of previous quarter in millions of dollars), and UNQ (number of unique visitors in previous month in thousands).

Table 1.3 summarizes descriptive statistics in addition to highlighting the correlation matrix of the key variables. Two key features stand out in Table 1.3. First, there is almost perfect correlation among the three accounting measures REV (revenues), MAR (gross margin), and SLM (sales and marketing expenses). Second, UNQ (unique users) has the highest correlation ($r = 0.469$) with PRICE (stock price). We decided to use the four aforementioned measures in this study for the following reasons:

- revenues are generally synonymous with the size of companies and are often used as measures of comparison from one organization to the next;
- gross margin is more important in the context of Internet stocks because of lack of profitability;
- sales and marketing expenses are leading indicators for the amount of investment net stocks are throwing into attracting new customers via online advertising; and
- unique visitors is a close proxy for the number of unique online customers a particular company has attracted.

Measuring revenue and gross margin is an obvious approach for tracking stock prices taught in most fundamental securities courses. Himmelstein (1999) describes why sales and marketing expenses should also be followed in the case of Internet stocks:



For five quarters running, CNET Inc. has done what few Internet companies have done: shown a profit. But now Chairman and Chief Executive Halsey M. Minor is chucking his conservative, money-making approach. On June 30, Minor announced that he will plunge into the red with a \$100 million ad campaign aimed at making CNET's name as synonymous with technology as ESPN is with sports. Says Minor: "This is a bold play for a dominant position. In putting growth ahead of profit, Minor hopes to emulate the success of other Web companies such as Amazon.com Inc. The online retailer is one of the top companies in cyberspace and the darling of investors—even though it won't make a dime until 2001 at the earliest."

Sparks (1999) makes the same case for the importance of sales and marketing expenses:

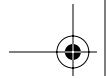
While hundreds of Internet companies are using a variety of ploys to become the market leader, heavy spending on marketing seems to be the real key to achieving dominance.

It is important to emphasize that many other accounting and Web-based measures could have been selected but leading Internet analysts Lise Buyer at CSFB and Steve Harmon at Steve-Harmon.com both affirm (in personal interviews) that these are the most closely watched by the investment community. Nocera (1999) points out that Steve Harmon is committed to using Web-based metrics:

Steve Harmon never had to capitulate on valuations. That's because he had decided from the very beginning that using the valuation "metrics" of the past for Internet stocks made no sense. So he decided to invent some metrics that he could apply to Internet companies.

One final, important note worth highlighting is that the 15 Internet companies were clustered into three categories, which is illustrated in Table 1.2. This was required in order to make logical comparisons of the UNQ variable. The first category includes Internet companies with *unique users* such as Yahoo and Lycos. These sites are so-called Web portals and act as launching pads for online activity that include functionality such as personalized Web pages and search engines. Most of the revenue generation at these sites comes from advertising dollars.

The second category includes Internet companies with *unique customers* such as Amazon.com and eBay. These e-commerce sites attract actual credit-card yielding customers who are willing to purchase or auction products over the Web. A significant amount of the revenue generated at these sites comes directly from the consumer, as is the case with Amazon.com, or as a service fee, as is the case with eBay.



Finally, the third cluster of companies represents online Internet service providers such as American Online and Earthlink who attract *unique subscribers*. This set of companies brings the consumer to the Internet by providing the consumer with home access to the Web. These companies receive actual monthly payments in the form of subscription fees.

Since the UNQ figure has slightly different definitions across these three segments of net stocks, we felt that it was important to control for this subtle but importance difference in our research methodology.

RESULTS

Triple-digit growth figures are commonplace for this sample of companies, as illustrated in Table 1.2. Therein lies the problem. The spectacular growth of these companies over the relative short period of time they were studied should be considered a blip in the normal rise of the equity markets. In fact, it is this meteoric phenomenon that leads us to reexamining how we are valuing stock price fluctuations for this specific sector.

Table 1.4 highlights the regression results of our study. First, the Base Model considers the two control variables only. C1 and C2 represent the two dummy variables that account for the three clusters of companies. The base model has a relatively low explanatory power ($R^2 = 3.6\%$) and is insignificant ($F = 2.755$, $p > 0.05$).

Model 1 builds on the previous model by simultaneously inserting all three of the traditional accounting measures: REV (revenues), MAR (gross margin), and SLM (sales and marketing). Although the explanatory power ($R^2 = 22.8\%$) and significance ($F = 8.502$, $p < 0.001$) were improved over the base model, this model has two fatal flaws. First, the beta coefficient for REV is *negative* ($\beta_1 = -2.669$, $p < 0.001$). Second, the VIF (variance inflation factor) values for each of these three variables is significantly greater than 10 (REV = 40.7, MAR = 39.5, SLM = 20.6). The regression results of Model 1 show that there is an inverse relationship between revenues and stock price. This is counterintuitive to the general pattern we see in equity markets where over the long-term both revenues and stock prices rise together. The results here call into question the fundamental relationships we have come to expect with stocks. In this particular sample of 15 Internet companies over the period we studied, there was an unexpected relationship between revenues and stock price. The second flaw of this model is that the high VIF values confirm a multicollinearity problem that exists among the variables. This was expected based on the high correlations of each variable found in Table 1.3 and may explain the unorthodox direction of the REV coefficient. Perhaps this problem can be mitigated by inserting only one financial indicator at a time coupled with the UNQ variable. The next three models test exactly that.

Table 1.4. Regression Results

	Base Model		Model 1		Model 2		Model 3		Model 4		Model 5	
	β^a	t^b	β^a	t^b	β^a	t^b	β^a	t^b	β^a	t^b	β^a	t^b
<i>Control Variables</i>												
C1	-0.157	1.688	-0.058	0.602	0.415	3.473***	0.354	2.884**	-0.157	1.688	0.170	1.748
C2	0.209	2.251**	0.050	0.519	0.397	3.435***	0.337	2.934**	-0.209	2.251*	0.232	2.147*
<i>Accounting Variables</i>												
REV			-2.669	5.710***	-0.304	3.329***						
MAR			1.900	4.128***			-0.232	2.397*				
SLM			0.882	2.654**					-0.263	2.753**		
<i>Web Variables</i>												
UNQ					0.806	7.320***	0.767	6.647***	0.809	6.803***	0.607	6.350***
<i>Results</i>												
R-Squared	3.6%		22.8%		29.8%		27.4%		28.2%		24.5%	
F-Stat	2.755		8.502		15.413		13.647		14.254		15.768	
Sig. of Δ^c			0.000		0.000		0.000		0.000		0.000	

^a Standardized beta (β) coefficient.

^b T-statistic, significance values * p value < 0.05, ** p value < 0.01, *** p value < 0.001

^c Significance of F-change considers Model 1 through 5 versus the Base Model.

Note: Model predictors include: C1 and C2 (two dummy variables for three types of net firms), REV (annualized revenues of previous quarter in millions of dollars), MAR (annualized gross margin of previous quarter in millions of dollars), SLM (annualized sales and marketing expenses of previous quarter in millions of dollars), and UNQ (number of unique visitors in previous month in thousands). The dependent variable in each model is the monthly stock price adjusted for splits and dividends as reported on the day of CSFB's Internet Valuation Update.

Multicollinearity problems existed with Model 1. VIF (variance inflation factor) values were greater than 10: REV = 40.7, MAR = 39.5, SLM = 20.6.

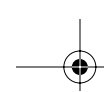
Models 2 through 4 examine the relationship of both traditional and Web-based measures by inserting one financial measure together with the UNQ variable. In Model 2 we inserted the REV and UNQ variables simultaneously to the base model. The explanatory power ($R^2 = 29.8\%$) and significance ($F = 15.413$, $p < 0.001$) of this model are relatively strong for predicting stock price. Since only one financial variable is used in this model, there is no multicollinearity, which is confirmed with adequate VIF values for all variables. Also, the introduction of the UNQ variable ($\beta_4 = 0.806$, $p < 0.001$) shows a positive and significant relationship with stock price. However, the interesting observation in this model is that the REV coefficient ($\beta_1 = -0.304$, $p < 0.001$) is significant but *negative*. As explained earlier, this result is not expected and is highly suspect.

It seems that for the period of this study and among these 15 companies, the Web-based variable UNQ was a positive and significant predictor of stock price, whereas REV acted in an inverse relationship with stock price. The same phenomenon is present in Models 3 and 4. Model 3 shows the MAR variable with a negative coefficient ($\beta_2 = -0.232$, $p < 0.05$) and Model 4 shows the SLM variable with a negative coefficient ($\beta_3 = -0.263$, $p < 0.01$), even though UNQ is positive and significant in all models.

In the case of Models 2, 3, and 4, we find the Web-based variable (UNQ) is positively associated with stock price. This makes intuitive sense since as the number of unique visitors for each Internet firm fluctuated widely from month to month during this period, so did stock prices. Interestingly, the accounting measures (REV, MAR, and SLM) were not positively associated with stock price. It seems that stock price fluctuations were inversely related to the financial growth of these companies. These results lend credence to the heated commentary in the public press surrounding the illogical valuations of Internet firms and further supports Hand's (1999) contention that larger losses in Web-based companies are associated with higher stock prices. We decided to test Model 5 to determine whether or not a solely Web-based model was valid.

In Model 5 we inserted the UNQ variable to the base model without any traditional financial measures. The explanatory power ($R^2 = 24.5\%$) and significance ($F = 15.768$, $p < 0.001$) of this model was on par with the others. In fact, the *F-stat* of this model is the highest of all. As predicted, the UNQ standardized coefficient ($\beta_4 = 0.607$, $p < 0.001$) is still positive, substantive, and significant.

Table 1.5 depicts an evaluation of each model based on the three conditions we specified earlier. First, we were hoping to find positive β coefficients for each variable as hypothesized. Every model except Model 5 had at least one variable that was not in the anticipated direction. Second, we were hoping to validate a robust model without any multicollinearity problems. Model 2 suffered from this due to the high correlations among the

**Table 1.5. Model Results**

Conditions	Model 1	Model 2	Model 3	Model 4	Model 5
I	x	x	x	x	✓
II	x	✓	✓	✓	✓
III	8	8	8	8	✓

Note: Conditions I: $\beta_1, \beta_2, \beta_3$, and $\beta_4 > 0$
II: the final specified model should be robust
III: β_4 should be substantive and significant

financial accounting variables (REV, MAR, and SLM). Finally, our third condition was to find a model that specified a positive, substantive, and significant β coefficient for the UNQ variable.

Model 5 is the only model that meets all three conditions while still remaining relatively strong in its explanatory power and overall significance. Based on these results we support the following hypothesis:

H1 Website metrics do as equally good a job at explaining Internet stock prices as traditional accounting measures do.

DISCUSSION

As with any study, there are limitations to this research. The small sample of 15 companies and only 10 data periods spanning one year limits the generalizability of the analysis. However, the Internet stock phenomenon was relatively new and little data was available, particularly in the area of Web metrics. In fact, during the period of this study many Internet stocks had only been trading for a few months and, thus, could not be included. A few months later in 2000, the technology crash rendered the stock price data invalid so the window of opportunity for studying this phenomenon was quite tight.

A second limitation to the analysis is the definition of gross margin used among public companies. The determination and accounting calculation of gross margin varies from company to company and is not expected to be precisely consistent among the included set. However, considering that gross margin was almost perfectly correlated with revenue ($r = 0.98$, Table 1.3), which is more consistently defined among companies, we can draw conclusions from the statistical testing of REV. We do not discount the limitation of the highly intercorrelated relationship but rather have sought to minimize the limitation through testing each of REV, MAR, and SLM independently of one another.



SPRING 2000 NASDAQ CRASH

Prior to and during the period of study, Internet stocks had generally shown very strong growth with the NASDAQ reaching an all-time high of over 5,100 points in March 2000, but fell nearly 35% by the end of April. Although specific conclusions cannot be drawn regarding the nature of the decline with respect to the valuation of Internet stocks, this event supports the idea that without a strong fundamental basis for stock prices, extreme volatility can be expected.

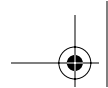
With the results of this study showing a strong relationship between the number of unique users and the valuation of Internet stocks without the consideration for traditional accounting measures, the writing for a potential crash may have been on the wall. While the use of Web metrics may not have served as an entirely accurate valuation methodology, it is our belief that analysts abused their usage when traditional profits were nowhere to be found. In sum, analysts resorted to using Web metrics as a proxy for valuation even though those measures had no fundamental connection to market capitalization.

IMPLICATIONS AND FUTURE DIRECTIONS

Analysts and investors alike are drowning in information overload. Individuals who study stocks from home have access to enormous amounts of financial facts and figures never before available to day-trading amateurs. All of this was taking place in a jungle-like virtual environment in which investors hungered for a little piece of the action. Of course, the bubble inevitably burst and trading volumes have since dropped significantly.

The results of this study highlight the abuse of Web-based metrics for valuation purposes by the analyst community at a time when traditional accounting measures did not have much explanatory power. We showed that stock price movement during that particular period was explained by Web metrics without much consideration for accounting measures. This revelation provides insight into the mindset of many investors and technology analysts during that period. For that period, analysts neglected the foundations of business (i.e., revenue and profit) in order to feed investors' greedy desires for capital accumulation with an alternative explanation (i.e., unique visitors).

Although the popularity of the original B2C (business-to-consumer) e-commerce model that spawned the dot-com revolution has been replaced with alternative forms, this research can be further advanced in the following ways. First, as time continues we will have access to more data both in terms of the number of companies worth studying (i.e., those who have



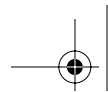
both thrived and died) and in terms of the length of period for which we can accumulate data. Second, we may consider hybrid measures that combine both financial and Web-based metrics such as (1) gross margin per user, or (2) sales and marketing expense per subscriber revenue. In both cases, researchers, analysts, and the technology firms themselves will be able to determine cost-benefit analyses using these measures. For example, using the second measure we can answer the following question: Are we spending too much money to attract new customers?

Academic researchers will also benefit from Web-based metric development innovations that will create new measures for analysis. For example, we could measure the click-through rates of certain banner ads and determine the ability for that online advertising to generate new customers. Alternatively, we could measure the amount of time each unique visitor spends in security-cache mode. Security-cache mode in a Web browser is automatically turned on when a consumer is about to make a credit-card purchase. This would help us consider the following situation in determining which Internet company is better to invest in:

Internet company A had an overall average online time of 4 hours for every unique customer during month X. Each customer spent 15 minutes of that time in security-cache mode. Internet company B had an overall online time of 2 hours for every unique customer with 30 minutes in security-cache mode.

Based on the previous scenario, is it better that more value-added time is spent actually purchasing (company B) or that customers spend more time looking for items to purchase (company A)? The answer is not that obvious because although company B may be in the best situation today, company A may provide the greater long-term revenue potential because of the larger product/service selection. There are also tangential implications for security design and navigation when such measures are available for study.

Another possible advantage of Web-based metrics in complementing traditional accounting metrics is the potential for daily reporting. Web-based metrics can be collected in real-time and be made available to management and the public at much shorter intervals for analysis. Investors will have the latest information on Web-based metrics and will not have to wait for quarterly reports or audited statements. In the future, it is probable that Internet companies will be required to disclose standard Web-based metrics in quarterly and annual reports along with other measures of financial performance.



CONCLUSION

Internet business models are in a state of flux as this industry continues to suffer from growing pains. What we do know is that early on in the dot-com boom, financial indicators were replaced with Web measures forcing shareholders to adopt untested methodologies for valuation.

The rise in Internet stocks (and especially B2C dot-coms) was akin to the California Gold Rush of 150 years ago. Day-traders were picking up net stocks quicker than prospectors bought barren mountainside. Yesterday's IPO celebrations have been compared to miners striking gold. In the dot-com market, investors were playing a game of Russian roulette by betting on potential winners. The feeding frenzy attracted all sorts of sharks. No one truly knew when or if the Internet bubble would burst. However, like geologists arguing over the best way to prospect for gold, analysts argued for a better way to find leading indicators for Internet stock price valuation.

The negative coefficients for the traditional metrics (revenue, gross margin, and sales and marketing expenses) show that—during the period of this study—the market very likely ignored the traditional financial indicators available for the companies included in the analysis. Furthermore, it is unclear whether the market directly considered the increases in unique visitors as a performance indicator or that the share price and the number of unique visitors both increased with the “hype” of a particular company as opposed to any financial fundamentals. In retrospect, this distinction is not as important as the fact that the predictive power of the Web-based metric appears to be positive, substantive, and significant during this time period.

Nevertheless, with full hindsight after this post-mortem analysis, we resort to suggesting that investing in Internet stocks was similar to gambling in a casino. Graham and Dodd (1951) originally said it best way back in 1934:

Unseasoned companies in new fields of activity provide no sound basis for the determination of intrinsic value. The risks inherent in the business, and uncertain management, and uncertain access to traditional capital combine to make an analytical determination of value unlikely if not impossible. Analysts serve their discipline best by identifying such companies as highly speculative and by not attempting to value them, even though we recognize there will be pressure to make valuations of initial public offering and other unseasoned issues. The buyer of such securities is not making an investment, but a bet, on a new technology, a new market, a new service, or a new innovation in an established business market. Winning in such situations can produce very rich rewards, but they are in an odd setting, rather than a valuation process.

APPENDIX: COMPANY DESCRIPTIONS

Yahoo! Inc.	1999 Sales \$588.6M USD	Drawing nearly 31 million visitors to its Website each month, Yahoo! can lay claim to the top spot among Internet portals. The company also boasts about 3,800 advertisers (banner ads bring in the bulk of Yahoo!'s revenue) and stands apart as one of the few Internet players operating in the black. Its Website features items such as e-mail, chat rooms, news, and stock quotes. Top Competitors: Lycos, Inc., Excite, Inc., America Online, Inc.
<i>www.yahoo.com</i>	Employees: 803	
Nasdaq YHOO	CEO: Timothy Koogle	
Fiscal Year Ends Dec. 31	CFO: Gary Valenzuela	
Lycos, Inc.	1999 Sales \$166.8M USD	Lycos is one of the fastest-growing net companies and remains an independent player among many Internet company consolidations. The Lycos Network offers Web searching, chat rooms, e-mail, news, and free personal home pages. Nearly 75% of Lycos' revenue is from advertising with the remainder from e-commerce agreements and licensing agreements with partners such as Bertelsmann and Microsoft. CMGI, an Internet investment firm, owns 20% of Lycos. Top Competitors: Yahoo! Inc., Infoseek Corporation, Excite, Inc.
<i>www.lycos.com</i>	Employees: 785	
Nasdaq / LCOS	CEO: Robert J. Davis	
Fiscal Year Ends July 31	CFO: Edward M. Philip	
Infoseek Corporation Bought by Go Network	1999 Sales \$217.2M USD	Through partnering with Walt Disney Company, Infoseek has evolved from a simple search engine to the operator of the GO Network, an Internet gateway combining Infoseek's search and directory services with Disney-related Websites such as ABCNEWS.com, Disney.com, ESPN.com, and Family.com. Almost 90% of the company's revenue comes from advertising, much of the remainder from technology licensing. Disney owns 43% of the company. Top Competitors: Yahoo! Inc., Lycos, Inc., America Online, Inc.
<i>infoseek.go.com</i>	Employees: 319	
Nasdaq / GO	CEO: Steven Bornstein	
Fiscal Year Ends Sep. 30	CFO: Spencer Neumann	
CNET, Inc.	1999 Sales \$112.3M USD	CNET is primarily an information portal for high-tech industries including computers, the Internet, and digital technologies. CNET operates several Websites including cnet.com, shareware.com, search.com, snap.com, and news.com. It also produces Internet-related television programs, which are carried on the USA Network and the Sci-Fi Channel. CNET receives over 3/4 of its revenue from Internet advertising. Top Competitors: ZDNet Group, Wired Digital, Inc., International Data Group
<i>www.cnet.com</i>	Employees:	
Nasdaq / CNET	CEO: Halsey M. Minor	
Fiscal Year Ends Dec. 31	CFO: Douglas N. Woodrum	

SportsLine USA, Inc.	1999 Sales \$60.3M USD	SportsLine USA operates cbs.sportsline.com providing real-time sports news. It covers sporting events, teams, and players including photos, audio, video clips, and Internet broadcast programs. Other SportsLine Websites provide information on sports superstars as well as information on major sporting events and gambling odds through vegasinsider.com. Advertising represents more than half of SportsLine's revenue while subscriptions, content licensing, and sports merchandise account for the remainder. CBS, which owns about 21% of the company, provides SportsLine with free advertising during TV sports broadcasts. Top Competitors: Walt Disney Company, Time Warner Inc., America Online, Inc.
<i>www.cbs.sportsline.com</i>	Employees: 400	
Nasdaq / SPLN	CEO: Michael Levy	
Fiscal Year Ends Dec. 31	CFO: Kenneth W. Sanders	
eBay, Inc.	1999 Sales \$224.7M USD	eBay is a personal Internet auction site on which sellers pay to have their items listed. Potential buyers browse and make bids on merchandise and eBay generates revenue by charging the seller a percentage of the closing price. The company has agreed to acquire Butterfield & Butterfield, the #3 auction house in the U.S. Top Competitors: ONSALE, Inc., uBid, Inc., Amazon.com, Inc.
<i>www.ebay.com</i>	Employees: 138	
Nasdaq / EBAY	CEO: Margaret C. Whitman	
Fiscal Year Ends Dec. 31	CFO: Gary F. Bengier	
Amazon.com, Inc.	1999 Sales \$1,640M USD	Amazon.com's Website offers books, CDs, videos, and gifts. It also competes with eBay by conducting auctions for a wide range of items. Aggressive expansion is driving growth and it has a stake in companies offering pet supplies, prescription drugs, and groceries. Amazon.com has recently announced plans to expand further, causing analysts to question their lack of operating profit. Amazon.com has put market share ahead of profits and continues to make acquisitions funded by their huge market capitalization. Top Competitors: eBay Inc., CDnow, Inc., Barnes & Noble, Inc.
<i>www.amazon.com</i>	Employees: 2,100	
Nasdaq / AMZN	CEO: Jeffrey P. Bezos	
Fiscal Year Ends Dec. 31	CFO: Warren Jensen	
Beyond.com	1999 Sales \$117.3M USD	Beyond.com (formerly software.net) is an online software retailer. It maintains an inventory of 40,000 units for direct shipment to customers. Relationships with about 350 software vendors provide an inventory of about 5,500 software titles that can be downloaded over the Internet. The company has marketing alliances with America Online, Excite, and Netscape. Chairman William McKiernan owns about 34% of the company. Top Competitors: Egghead.com, Inc., Digital River, Inc., CNET, Inc.
<i>www.beyond.com</i>	Employees: 137	
Nasdaq / BYND	CEO: Rick Neely	
Fiscal Year Ends Dec. 31	CFO: Rick Neely	

Cyberian Outpost, Inc.	1999 Sales \$145.6M USD	Cyberian Outpost uses the Internet to sell brand name computer hardware, software, and peripherals to consumers. The site offers more than 130,000 items and obtains its products directly from manufacturers, distributors, and software publishers. Almost half of Cyberian's sales come from international customers; thus, it has translated its Website into 12 foreign languages and offers online currency-conversion information. Top Competitors: Ziff-Davis Inc., Egghead.com, Inc., Beyond.com
<i>www.outpost.com</i>	Employees: 156	
Nasdaq / COOL	CEO: Darryl Peck	
	CFO: Katherine N. Vick	
ONSALE, Inc. Prior to Egghead Merger	1998 Sales \$207.8M USD	ONSALE operates Web auctions selling items such as computers and related products, consumer electronics, sports equipment, and time-share condominiums. ONSALE has more than 650,000 registered bidders with 75% of sales from repeat customers. Major shareholders include VP and chief technology officer Alan Fisher (32%) and CEO Jerry Kaplan (28%). Top Competitors: Micro Warehouse, Inc., uBid, Inc., eBay Inc.
<i>www.onsale.com</i>	Employees: 200	
Nasdaq / ONSL	CEO: S. Jerrold Kaplan	
Fiscal Year Ends Dec. 31	CFO: John Labbett	
Egghead.com, Inc. Prior to OnSale Merger	1998 Sales \$148.7M USD	Egghead.com has closed all of its brick-and-mortar stores and become an Internet-only reseller of PC hardware, software, and accessories. Its Website offers about 40,000 products as well as excess, reconditioned, and closeout brand-name computer products. A 24-hour hardware and software auction site offers an alternative for bargain hunters. The focus is on PC products with consumer electronics rounding out the product offering. Top Competitors: Cyberian Outpost, Inc., CompUSA Inc., Beyond.com
<i>www.egghead.com</i>	Employees: 337	
Nasdaq / EGGS	CEO: George P. Orban	
Fiscal Year Ends Dec. 31	CFO: Brian B. Bender	
At Home Corporation	1999 Sales \$227.4M USD	At Home uses cable TV systems to provide high-speed Internet access to consumers (@Home) and businesses (@Work). Access is about a hundred times faster than traditional telephone modems but comes at a price premium. At Home partners with cable operators to market and provide its services and currently has about 500,000 customers in the U.S. and Canada. AT&T Broadband and Internet Services has 40% ownership as well as other investors Cablevision, Comcast, and Cox. Top Competitors: Microsoft Corporation, US WEST, Inc., Time Warner Inc.
<i>www.home.net</i>	Employees: 570	
Nasdaq / ATHM	CEO: George Bell	
Fiscal Year Ends Dec. 31	CFO: Kenneth A. Goldman	



MindSpring Enterprises, Inc.	1999 Sales \$275.0M USD	MindSpring Enterprises has more than one million subscribers throughout the U.S. and competes with EarthLink for the #4 spot behind American Online, the Microsoft Network, and AT&T WorldNet. Dial-up Internet access offerings account for nearly 85% of revenue and the company also provides Web hosting dedicated lines for businesses. MindSpring is focusing on outstanding customer service and is beginning to offer high-speed cable modem access over leased networks. Top Competitors: Microsoft Corporation, EarthLink Network, Inc., America Online, Inc.
<i>www.mindspring.net</i>	Employees: 2,051	
Nasdaq / MSPG	CEO: Charles M. Brewer	
Fiscal Year Ends Dec. 31	CFO: Juliet Reising	
America Online, Inc.	1999 Sales \$5720M USD	America Online (AOL), the #1 provider of online services, acquired CompuServ in 1998 and Netscape Communications in 1999. Through these acquisitions it has grown to 17 million subscribers and integrated the Netscape portal into its offering. Top Competitors: Yahoo! Inc., AT&T Corp., Microsoft Corporation
<i>www.aol.com</i>	Employees: 12,100	
Nasdaq / AOL	CEO: Stephen M. Case	
Fiscal Year Ends June 30	CFO: J. Michael Kelly	
EarthLink Network, Inc.	1999 Sales \$435.0M USD	Earthlink Network, an ISP, has more than one million customers throughout North America and competes with EarthLink for the #4 spot among U.S. ISPs (behind America Online, the Microsoft Network, and AT&T WorldNet). Sprint, owning 29.5% of EarthLink, co-brands as EarthLink Sprint Internet. The company's software package, TotalAccess, works with third-party browsers such as Navigator and Internet Explorer, and is marketed to retailers, publishers, and consumer product makers. Top Competitors: Microsoft Corporation, America Online, Inc.
<i>www.earthlink.net</i>	Employees: 1,343	
Nasdaq / ELNK	CEO: Charles G. Betty	
Fiscal Year Ends Dec. 31	CFO: Grayson L. Hoberg	

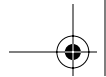
Note: Egghead.com and OnSale, Inc. completed a merger on November 22, 1999. The company is called Egghead.com, Inc. EGGS (NASDAQ)
MindSpring Enterprises, Inc. and EarthLink Network, Inc. merged on February 4, 2000. The company is called EarthLink, Inc. ELNK (NASDAQ)
Sales figures are for the Twelve Trailing Months as of the most recent quarterly report.

REFERENCES

- Adamson, D. (2000, January 5). The truth about tracking stocks. *CBS MarketWatch*.
<http://cbs.marketwatch.com/archive/20000105/news/current/clueless.htx>
Bontis, N. (1996, Summer). There's a price on your head: Managing intellectual capital Strategically. *Business Quarterly*, pp. 40–47.



- Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. *Management Decision*, 36, 63–76.
- Bontis, N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. *International Journal of Technology Management*, 18, 433–462.
- Bontis, N. (2001). CKO wanted—Evangelical skills necessary: A review of the Chief Knowledge Officer position. *Knowledge and Process Management*, 8, 29–38.
- Bontis, N. (2002). *World Congress on Intellectual Capital readings*. Boston: Butterworth Heinemann KMCI Press.
- Bontis, N., Crossan, M., & Hulland, J. (2002). Managing an organizational learning system by aligning stocks and flows. *Journal of Management Studies*, 39, 437–469.
- Bontis, N., Dragonetti, N., Jacobsen, K. & Roos, G. (1999). The knowledge toolbox: A review of the tools available to measure and manage intangible resources. *European Management Journal*, 17, 391–402.
- Briody, D., McDonald, D., & Moskowitz, E. (2002, January). The educated investor. *Red Herring*, pp.86–90.
- Cooper, M., Dimitrov, O., & Rau, P. R. (1999). *A rose.com by any other name*. Working paper, Purdue University.
- Crossan, M., Lane, H. W., & White, R. E. (1999). An organizational learning framework: From intuition to institution. *Academy of Management Review*, 24, 522–537.
- Davis, J., Halper, M., Grebb, M., & Schibsted, E. (1999, March). Are you next: 20 industries that must change. *Business 2.0*, pp. 44–54
- Fox, J., & Hodges, J. (1999, June 7). Net stock rules: Masters of a parallel universe. *Fortune*, pp. 66–70.
- Graham, B., & Dodd, D. L. (1951). *Security analysis: Principles and techniques* (3rd ed.). New York: McGraw-Hill.
- Hand, J. (1999). *Profits, losses, and the stock prices of Internet firms*. Working paper, University of North Carolina, Chapel Hill.
- Himelstein, L. (1999, July 12). CNET goes for broke. *Business Week*, p. 37.
- Kim, O., & Verrecchia, R. (1997). Pre-announcement and event-period information. *Journal of Accounting and Economics*, 24, 395–419.
- Lashinsky, A. (1999, August 16). Net stocks' secret weapon: Cash. *Fortune*, p.196.
- Nocera, J. (1999, June 7). Do you believe? How Yahoo! became a blue chip. *Fortune*, p. 92.
- Nonaka, I. & Takeuchi, H. (1995). *The knowledge-creating company*. New York: Oxford University Press.
- Ohlson, J. A. (1995). Earnings, equity book values, and dividends in equity valuation. *Contemporary Accounting Research*, pp. 661–687.
- Schill, M. J., & Zhou, C. (1999). *Pricing an emerging industry: Evidence from Internet subsidiary carve-outs*. Working paper, University of California at Riverside.
- Sparks, D. (1999, May 31). Who's getting more bang for the marketing buck. *Business Week*, pp. 148–150.
- Stewart, T. A. (1997). *Intellectual capital: The new wealth of organizations*. New York: Doubleday/Currency.
- Stovel, M. & Bontis, N. (2002). Voluntary turnover: Knowledge management friend or foe. *Journal of Intellectual Capital*, 3, 303–322.



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- Sveiby, K. E. (1997). *The new organizational wealth: Managing and measuring knowledge-based assets*. New York: Berrett-Koehler.
- Vonder Haar, S. (1999, June). Web metrics: Go figure. *Business 2.0*, pp. 46–47.
- Wooley, S. (1999, January). Internet insanity [Special issue]. *Money*, 28.
- Wysocki, P. D. (1998). *Cheap talk on the Web: The determinants of postings on stock message boards*. Working paper, University of Michigan Business School.

